

**AS22759/82**

FEDERAL SUPPLY CLASS  
6145

UNDER DEPARTMENT OF DEFENSE POLICIES AND PROCEDURES, ANY QUALIFICATION REQUIREMENTS AND ASSOCIATED QUALIFIED PRODUCTS LISTS ARE MANDATORY FOR DOD CONTRACTS. ANY REQUIREMENT RELATING TO QUALIFIED PRODUCTS LISTS (QPL'S) HAS NOT BEEN ADOPTED BY SAE AND IS NOT PART OF THIS SAE TECHNICAL DOCUMENT.

The diagram shows the orthographic projection of a cone. On the left is the front view, which is an isosceles triangle with a horizontal base and a vertical axis of symmetry. On the right is the top view, which is a circle with a vertical axis of symmetry. A horizontal dashed line represents the ground line, separating the two views.

**REV.**  
**A**

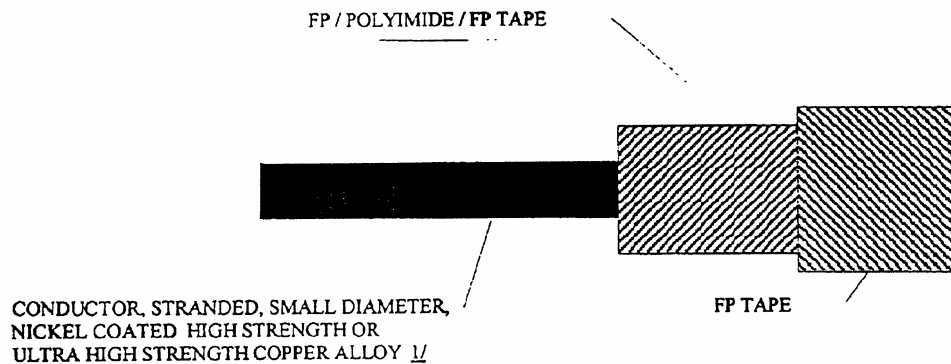
**SAE Aerospace**  
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THE REQUIREMENTS FOR ACQUIRING THE PRODUCT DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DEPARTMENT OF DEFENSE INDEX OF SPECIFICATIONS AND STANDARDS (DODISS) SPECIFIED IN THE SOLICITATION: MIL-W-22759.

REVISION A IS EDITORIAL ONLY, FOR INSERTION OF THE FOLLOWING STATEMENT. "THIS SPECIFICATION IS NOT INTENDED FOR USE IN NAVAL AIRCRAFT OR NAVAL AIR SYSTEMS APPLICATIONS."



FP - Fluorocarbon Polymer, modified Polytetrafluoroethylene (PTFE)

1/ Alloy Conductor: The size 26 conductor shall be ultra-high strength copper alloy. The breaking strength shall be 21.5 lbs. (min.) and the conductor elongation 6.0% (min.). All other gauge sizes shall be high strength copper alloy in accordance with MIL-W-22759.

FIGURE 1. GENERAL CONFIGURATION.

TABLE I. CONSTRUCTION DETAILS.

| Part No. <u>1/</u> | Wire Size | Conductor  |                   |        | Finished Wire   |                   |       |                                      |
|--------------------|-----------|--|-------------------|--------|---|-------------------|-------|--------------------------------------|
|                    |           | Stranding<br>(number of strands<br>x AWG gauge of strands) | Diameter<br>(in.) |        | Resistance<br>at 20° C<br>(68°F)<br>(ohms/ 1000<br>ft max.) | Diameter<br>(in.) |       | Weight<br>(lb./1000<br>Ft)<br>(Max.) |
|                    |           |  | MIN.              | MAX.   |   | Min.              | Max.  |                                      |
| M22759/82-26-*     | 26        | 19 x 38  | 0.0175            | 0.0204 | 58.4  | 0.030             | 0.034 | 1.43                                 |
| M22759/82-24-*     | 24        | 19 x 36  | 0.0225            | 0.0254 | 30.1  | 0.034             | 0.038 | 1.93                                 |
| M22759/82-22-*     | 22        | 19 x 34  | 0.0285            | 0.0314 | 18.6  | 0.040             | 0.043 | 2.85                                 |
| M22759/82-20-*     | 20        | 19 x 32  | 0.0365            | 0.0404 | 11.4  | 0.048             | 0.051 | 4.38                                 |

1/ Part Number: The asterisks in the part number column of Table I shall be replaced by color code designators in accordance with MIL-STD-681. Examples: M22759/82-20-93 is a 20 AWG white with orange stripe.

TABLE II. WIRE INSULATION MATERIALS. 1/

| Tape Code | Thickness (Nom) | Material                                      |
|-----------|-----------------|---|
| 1         | 0.0012          | .00045 (FP) / .00065 (Polyimide) / .0001 (FP) |
| 2         | 0.0020          | FP (Unsintered)                               |

<sup>1/</sup> Physical properties of FP unsintered tapes shall be in accordance with MIL-W-22759 requirements.

TABLE III. PHYSICAL PROPERTIES OF FP/POLYIMIDE/FP TAPES.

|                     |   |
|---------------------|---|
| Tensile Strength    | 20,000 lb/in sq. (average minimum)        |
| Tensile Modulus     | 400,000 lb/in sq. (average minimum)       |
| Elongation          | 40 percent (average minimum)              |
| Dielectric Strength | 4,000 volts/mil (average minimum)         |
| .00045 FP Layer     | Distinguishable color (next to conductor) |

TABLE IV. TAPE OVERLAP REQUIREMENTS. 1/

| Wire Size | Wrap 1    |                 |      | Wrap 2    |                 |      | Nominal Wall Thickness (mils) |
|-----------|-----------|-----------------|------|-----------|-----------------|------|-------------------------------|
|           | Tape Code | Percent Overlap |      | Tape Code | Percent Overlap |      |                               |
|           |           | Min             | Max  |           | Min             | Max  |                               |
| 26        | 1         | 50.5            | 54.0 | 2         | 50.5            | 54.0 | 5.8                           |
| 24        | 1         | 50.5            | 54.0 | 2         | 50.5            | 54.0 | 5.8                           |
| 22        | 1         | 50.5            | 54.0 | 2         | 50.5            | 54.0 | 5.8                           |
| 20        | 1         | 50.5            | 54.0 | 2         | 50.5            | 54.0 | 5.8                           |

<sup>1/</sup> Wrap 1 is innermost tape which is in contact with the conductor with the 0.00045 inch FP side of the tape against the conductor (when applicable).

TABLE V. FLUID TABLE.

| Test Fluid  | Test temperature<br>(°C (°F)) | Immersion<br>time (hrs.) |
|---|-------------------------------|--------------------------|
| A. MIL-A-8243 Anti - icing and Deicing Defrosting Fluid, undiluted  | 48 - 50 (118 - 122)           | 20                       |
| B. MIL-A-8243 Anti - icing and Deicing Defrosting Fluid, diluted 60/40 (fluid/water) ratio                    | 48 - 50 (118 - 122)           | 20                       |
| C. MIL-C-43616, Cleaning Compound, Aircraft Surface, Type I   | 48 - 50 (118 - 122)           | 20                       |
| D. ASTM D1153, Methyl Isobutyl Ketone (For use in Organic Coatings)   | 20 - 25 (68 - 77)             | 168                      |
| E. SAE AS 1241, Fire Resistant Hydraulic Fluid for Aircraft   | 48 - 50 (118 - 122)           | 20                       |
| F. MIL-L-7808, Lubricating Oil, Aircraft Turbine Engine, Synthetic Base                                       | 118 - 121 (244 - 250)         | 30                       |
| G. MIL-C-87937, Cleaning Compound, Aerospace Equipment, Type II or Type IV, undiluted                         | 63 - 68 (145 - 154)           | 20                       |
| H. MIL-C-87937, Cleaning Compound, Aerospace Equipment, Type II or Type IV, diluted 25/75 (fluid/water) ratio | 63 - 68 (145 - 154)           | 20                       |
| I. TT-S-735, Standard Test Fluids: Hydrocarbon, Type I  | 20 - 25 (68 - 77)             | 168                      |
| J. TT-S-735, Standard Test Fluids: Hydrocarbon, Type II   | 20 - 25 (68 - 77)             | 168                      |
| K. TT-S-735, Standard Test Fluids: Hydrocarbon, Type IV   | 20 - 25 (68 - 77)             | 168                      |
| L. Dielectric - coolant Fluid Synthetic Silicate Ester Base, Monsanto Coolanol 25 or approved equivalent.     | 20 - 25 (68 - 77)             | 168                      |
| M. MIL-G-3056, Gasoline, Automotive, Combat   | 20 - 25 (68 - 77)             | 168                      |

## RATINGS:

TEMPERATURE RATING: 260°C (500°F) MAXIMUM CONTINUOUS CONDUCTOR TEMPERATURE.

VOLTAGE RATING: 600 VOLTS (RMS.) AT SEA LEVEL

## ADDITIONAL REQUIREMENTS:

WET ARC PROPAGATION RESISTANCE (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST IN ACCORDANCE WITH MIL-STD-2223 METHOD 3006. MEASURE THE DAMAGE OF THE BUNDLE ALONG THE AXIS. THE WIRE IS ACCEPTABLE IF THE FOLLOWING CRITERIA ARE MET:

1. A MINIMUM OF 64 WIRES PASS THE DIELECTRIC TEST.
2. THREE WIRES OR LESS FAIL THE DIELECTRIC TEST IN ANY ONE BUNDLE.
3. ACTUAL DAMAGE TO THE WIRE IS NOT MORE THAN 3 INCHES IN ANY TEST BUNDLE.

DRY ARC PROPAGATION RESISTANCE (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST IN ACCORDANCE WITH MIL-STD-2223 METHOD 3007. MEASURE THE DAMAGE OF THE BUNDLE ALONG THE AXIS. THE WIRE IS ACCEPTABLE IF THE FOLLOWING CRITERIA ARE MET:

1. A MINIMUM OF 64 WIRES PASS THE DIELECTRIC TEST.
2. THREE WIRES OR LESS FAIL THE DIELECTRIC TEST IN ANY ONE BUNDLE.
3. ACTUAL DAMAGE TO THE WIRE IS NOT MORE THAN 3 INCHES IN ANY TEST BUNDLE.

BLOCKING: 260°C ± 2°C (500°F ± 3.6°F)

COLOR: IN ACCORDANCE WITH MIL-STD-104, CLASS 1; EXCEPT AS NOTED BELOW. WHITE PREFERRED. CONFORMITY OF COLOR TO THE LIMITS OF MIL-STD-104 SHALL NOT BE REQUIRED AFTER OVEN EXPOSURE.

| Color  | Hue           |       | Value         |     | Chroma        |     |
|--------|---------------|-------|---------------|-----|---------------|-----|
|        | From          | To    | From          | To  | From          | To  |
| Black  | 2.5RN         | 2.5RN | 7             | 8.5 | N/A           | N/A |
| Blue   | 5PB           | 7.5B  | 7             | 8   | 4             | 6   |
| Green  | 2.5G          | 7.5G  | 7             | 9   | 2             | 6   |
| Red    | 10RP          | 5R    | 7             | 8   | 4             | 6   |
| Yellow | 5Y            | 10Y   | 8             | 9   | 4             | 6   |
| Brown  | 2.5YR         | 7.5R  | 7             | 9   | 2             | 4   |
| Orange | 10R           | 2.5YR | 6             | 7   | 8             | 10  |
| Violet | 2.5P          | 7.5R  | 7             | 8   | 4             | 8   |
| Gray   | Same as Black |       | Same as Black |     | Same as Black |     |

COLOR STRIPING OR BANDING DURABILITY: 125 CYCLES (250 STROKES), 250 GRAMS WEIGHT

CONDUCTOR STRAND ADHESION: NOT REQUIRED

CONTINUOUS LENGTHS: SCHEDULE B

DYNAMIC CUT-THROUGH (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST ONLY IN ACCORDANCE WITH ASTM D 3032, SECTION 22. BLADE SHALL BE THE STANDARD CUTTING BLADE EXCEPT THE CUTTING EDGE RADIUS SHALL BE  $0.005 \pm 0.001$  INCH. MINIMUM AVERAGE DYNAMIC CUT-THROUGH (LBS) SHALL BE AS SHOWN IN THE FOLLOWING TABLE:

| Wire Size | 23 $\pm$ 5°C | 150 $\pm$ 5°C | 200 $\pm$ 5°C | 260 $\pm$ 5°C |
|-----------|--------------|---------------|---------------|---------------|
| 26        | 8 lbs.       | 6 lbs.        | 4 lbs.        | 3 lbs.        |
| 20        | 10 lbs.      | 8 lbs.        | 6 lbs.        | 4 lbs.        |

FLAMMABILITY: TEST IN ACCORDANCE WITH MIL-STD-2223, METHOD 1006, PROCEDURE A.

REQUIREMENTS:

DURATION OF AFTER-FLAME 3 SECONDS (MAX)

FLAME TRAVEL 3.0 INCHES (MAX)

NO FLAMING OF TISSUE

FORCED HYDROLYSIS: (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY) 2000 HOURS AT 70°C. TEST 5 SAMPLES OF AWG SIZE 20 ONLY IN ACCORDANCE WITH SAE AS4373 METHOD 602. ALL 5 SAMPLES MUST PASS THE DIELECTRIC TEST AS LISTED IN METHOD 602.

HIGH FREQUENCY SPARK TEST: (WHEN USED IN LIEU OF IMPULSE DIELECTRIC TEST) TEST IN ACCORDANCE WITH MIL-STD-2223 METHOD 3008, 5.7 KILOVOLTS (RMS.) TEST 100 PERCENT OF THE WIRE.

HUMIDITY RESISTANCE: AFTER HUMIDITY EXPOSURE WIRE SHALL MEET THE REQUIREMENTS FOR INITIAL INSULATION RESISTANCE.

IDENTIFICATION OF PRODUCT: NOT REQUIRED FOR SIZE 26. COLOR CODE DESIGNATOR NOT REQUIRED.

IDENTIFICATION DURABILITY: 125 CYCLES (250 STROKES), 250 GRAMS WEIGHT.

IMMERSION (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST IN ACCORDANCE WITH MIL-STD-2223 METHOD 1001 INCLUDING THE ADDITIONAL FLUIDS LISTED IN TABLE V OF THIS SPECIFICATION. USE MANDRELS AND WEIGHTS LISTED IN TABLE VI FOR BEND TESTING. DIELECTRIC TEST, 2500 VOLTS (RMS), 60 HZ. FOR TURBINE FUEL IMMERSION TEST OF MIL-STD-2223, EITHER JP4 OR MIL-T-83133 TYPE JP-8 (NATO TYPE F-34) MAY BE USED.

IMPULSE DIELECTRIC TEST: 8.0 KILOVOLTS (PEAK). TEST 100 PERCENT OF THE WIRE

INSULATION RESISTANCE: 5000 MEGOHMS FOR 1000 FEET (MIN.)

INSULATION STATE OF SINTER: (TEST REQUIRED FOR QUALIFICATION) EVALUATE FP LAYERS WITH A DIFFERENTIAL SCANNING CALORIMETER PER ASTM D 4591.

|            | Energy to Melt (Joules/gram) |
|------------|------------------------------|
| First Heat | Less than 25 J/g             |

LIFE CYCLE: 500 HOURS AT 290°C ± 2°C (554°F ± 3.6°F). DIELECTRIC TEST, 2500 VOLTS (RMS), 60 HZ. USE MANDRELS COATED WITH POLYTETRAFLUOROETHYLENE SUCH THAT THE DIAMETER OF THE MANDRELS, AFTER COATING, STILL CONFORM TO THE REQUIRED TEST MANDRELS DIAMETERS OF TABLE VI. AFTER OVEN EXPOSURE, LAYERS SHALL NOT SEPARATE AND OR TAPES SHALL NOT LIFT ALONG THE INSULATION OR AT THE ENDS.

LOW TEMPERATURE (COLD BEND): USE MANDRELS AND WEIGHTS SPECIFIED IN TABLE VI. CHAMBER TEMPERATURE, -65°C ± 2°C (-85°F ± 3.6°F). DIELECTRIC TEST, 2500 VOLTS (RMS), 60 HZ.

SHRINKAGE: 0.091 INCH (MAX.) AT 290°C ± 2°C (554°F ± 3.6°F).

SMOKE: 260°C ± 5°C (500°F ± 9°F); NO VISIBLE SMOKE

SOLDERABILITY: NOT REQUIRED. THIS SLASH SHEET IS PRIMARILY INTENDED FOR CRIMP TERMINATIONS. FOR SOLDERABILITY APPLICATIONS USE THE SILVER COATED COPPER VERSION OF THIS SPECIFICATION.

STRIPPABILITY: (GROUP II QUALITY CONFORMANCE TEST). TEST IN ACCORDANCE WITH ASTM D3032 SECTION 27. THE LENGTH OF THE INSULATION SLUGS SHALL BE 0.25 INCHES. STRIP FORCES SHALL BE AS FOLLOWS. NO EVIDENCE OF INSULATION SHALL BE LEFT ON THE CONDUCTOR WHEN VIEWED WITH THE NAKED EYE.

| Wire Size | Min. Force | Max. Force |
|-----------|------------|------------|
| 20-26     | 0.25 lb.   | 6.0 lbs.   |

TAPE OVERLAP: IN ACCORDANCE WITH MIL-STD-2223, METHOD 6005

TENSILE MODULUS: TEST COMPOSITE FILM IN ACCORDANCE WITH ASTM D 882, METHOD A

THERMAL INDEX: 260°C ± 5°C (500°F ± 9°F) MINIMUM FOR 10,000 HOURS (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY). TEST SIZE 20 ONLY IN ACCORDANCE WITH ASTM D 3032, SECTION 14.

THERMAL SHOCK RESISTANCE: OVEN TEMPERATURE, 260°C ± 5°C (500°F ± 9°F), MAXIMUM CHANGE IN MEASUREMENT, 0.091 INCHES. NO CRACKING.

UV LASER MARKING: (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY) FP MATERIALS SHALL BE FORMULATED IN SUCH A MANNER TO ACHIEVE A 62% MINIMUM CONTRAST LEVEL WHEN MARKED BY AN ULTRAVIOLET (UV) LASER SOURCE OPERATING AT A DELIVERED POWER NOT TO EXCEED 1.5 JOULES/CM<sup>2</sup>. THE CONTRAST LEVEL IS DEFINED AS

$$CL = \frac{(\text{Reflectance of the background insulation} - \text{Reflectance of the laser mark})}{\text{Reflectance of the background insulation}} \times 100$$

WRAP (MANDREL WRAP): NO CRACKING, NO DIELECTRIC BREAKDOWN. USE MANDRELS SPECIFIED IN TABLE VI. DIELECTRIC TEST, 2500 VOLTS (RMS), 60 HZ.

TABLE VI. TEST MANDREL AND TEST LOAD REQUIREMENTS.

| Wire<br>Size<br>(AWG) | Test Mandrel Diameter <sup>1/</sup><br>(inches) |                          |       | Test Load <sup>1/</sup><br>(lbs) |                          |
|-----------------------|---|--------------------------|-------|----------------------------------|--------------------------|
|                       | Cold Bend                                       | Life Cycle/<br>Bend Test | Wrap  | Cold Bend                        | Life Cycle/<br>Bend Test |
| 26                    | 1.00  | 0.375                    | 0.125 | 3.00                             | 0.50                     |
| 24                    | 1.00  | 0.500                    | 0.125 | 3.00                             | 0.75                     |
| 22                    | 1.00  | 0.500                    | 0.125 | 4.00                             | 1.00                     |
| 20                    | 1.00  | 0.500                    | 0.125 | 4.00                             | 1.50                     |

<sup>1/</sup> Tolerance shall be  $\pm 3$  percent of the given values.

#### QUALIFICATION OF WIRE:

FOR QUALIFICATION, A SOURCE IS REQUIRED TO SUBMIT DATA ON QUALITY CONFORMANCE TESTS AND ANY FINISHED WIRE TESTS AS REQUIRED BY THE QUALIFICATION AUTHORIZATION LETTER. ALL OTHER TESTING WILL BE PERFORMED BY THE QUALIFYING ACTIVITY AT THE SOURCE'S EXPENSE.

DUE TO THE EXTENDED TIME PERIOD OVER WHICH THE THERMAL INDEX TEST IS PERFORMED, A SOURCE MAY BECOME QUALIFIED UNDER THIS SPECIFICATION SHEET WHILE THIS TEST IS STILL IN PROGRESS.